UNIVERSITY OF WAIKATO ANIMAL ETHICS COMMITTEE

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Protocol Number: 897

APPLICATION COVER SHEET

Project Details
Full Protocol Title: Calves preference for rearing substrate **Name of Primary Applicant**: Gemma Worth **Faculty/School/Department:** Psychology **Expected start date**: 1/7/13 **Expected completion date**: 11/10/13 **Animals species:** Cattle (common name) **Number to be used:** 28 (including 4 'spares') **Impact Level:** B (See Q 6 Animal Use Statistics Form – Appendix 1):

Type of Application (Can tick more than one box):	✓ Research ✓Part of research thesis ☐ Teaching ☐ Other (Specify)

Standard Operating Procedures:	☐ No ✓ Yes**:** SOP Number/ Title: CATTLE Jugular blood collection (Calves) GMSOP 04 06 (AgResearch)

Other AEC approval:	Has this application been submitted any other AEC for approval ☐ No ✓ Yes (Specify Committee) Details: AgResearch (Ruakura) Animal Ethics Committee

Funding support:	Is this research part of a funding grant either received or pending ✓ No ☐ Yes (Specify funding source) Details:

OFFICE USE ONLY This proposal is approved for the period: **From:**	***Protocol Number:*** **To:**
Signature AEC Chair:	**Date:**

All research involving the use of animals must comply with the *Animal Welfare Act (1999)* and the University of Waikato Code of Ethical Conduct for the Use of Animals in Teaching and Research.

Please submit this form to the Animal Ethics Committee, Research Office, B Block, University of Waikato or email animal.ethics@waikato.ac.nz

APPLICATION

Section1: Personnel Information

1.1 PRIMARY APPLICANT (Researcher or student undertaking thesis)	
Title, first name, last name: Miss Gemma Worth	
Qualifications: Postgraduate Diploma (2012) Bachelor of Social Sciences (2006)	
Mailing address: AgResearch Ruakura Research Centre 10 Bisley Road Hamilton	
Email: gemma.worth@agresearch.co.nz	**Phone**: 07 838 5554
Please detail the relevant experience you have (including the number of years) in the procedures/techniques to be used in this project.	
I have been working in this field with AgResearch full time for 6 years.	

1.2 CHIEF SUPERVISOR (WHEN APPLICABLE) TO BE COMPLETED BY THE STUDENT'S SUPERVISOR (IT IS EXPECTED THAT THE SUPERVISOR WILL ASSIST THE STUDENT WITH THE DEVELOPMENT OF THIS APPLICATION)	
Title, first name, last name Professor Mary Foster	
Qualifications:	
Mailing address:	
Email: psyc0182@waikato.ac.nz	**Phone**:
What is your Role in this project?	
Professor Foster will meet regularly with Gemma and the scientists involved as co-supervisors of the project to discuss the project and its progress. She will also meet regularly with Gemma to discuss and give advice on how to deal with any issues that arise during the course of the project, to help with data presentation and data analysis and to guide and provide feedback on the write up of the project.	
Please detail the relevant experience you have (including the number of years) in the procedures/techniques to be used in this project.	
Professor Foster has had over 30 years' experience of animal behaviour research and with supervising theses in this area.	

1.3 OTHER PERSONNEL MUST INCLUDE DETAILS OF VETERINARIAN TO THE PROJECT

Title, First Name, Last Name	Qualification	Contact details	Role in Project
Dr Ali Cullum	Veterinarian	027 288 3068	Veterinarian to the Project, Animal Welfare Officer
Dr Mhairi Sutherland	Scientist	838 5503	AgResearch Supervisor
Dr Mairi Stewart	Scientist	838 5564	AgResearch Supervisor

Section 2: Project Description

2.1 LAY SUMMARY OF OVERALL PROJECT (one paragraph)
(To be written in terms that people with a non-scientific background will understand)

For this study, we propose to test dairy calves' preference for 4 different bedding substrates - sawdust (as the 'gold' standard), sand, rubber chip (a product made from used truck tyres) and river stones (used in previous studies). Calves will be exposed to 4 consecutive phases including a free choice, restriction and pair wise test to determine preference. This study is to provide farmers with information regarding calf preference toward different bedding substrate and to confirm that the alternatives are acceptable from an animal welfare viewpoint.

2.2 AIM OF THE PROJECT
(Brief and written in terms that people with a non-scientific background will understand)

To evaluate calf preference for different rearing substrates and to provide information that can be used for recommendations for farmers rearing dairy calves.

2.3. BACKGROUND
(Include a short review of previous relevant studies in this area and references where appropriate)

Good management of the pre-weaning rearing environment of dairy calves is essential to reduce stress and the risk of disease; critical factors include thermoregulation and hygiene. One particularly important aspect of calf management is the type of substrate used when rearing calves. The effect of different substrate types on the behaviour, cleanliness, growth and health of dairy calves has been investigated by AgResearch and in the literature, materials studied include river stones (AgResearch), granite fines, sand, rice hulls, straw, wood shavings, rubber mats and concrete (Panivivat et al., 2004; Hanninen et al., 2005; Hill et al., 2011). The type of substrate used in calf rearing facilities can affect calf cleanliness (Panivivat et al., 2004), weight gain and scouring (Hill et al., 2011).

The type of substrate used in calf rearing facilities can also influence animal behaviour. Calves reared on river stones spent less time lying and playing compared with calves reared on sawdust (AgResearch). Calves reared on rice hulls and sand spent more time self-grooming than calves reared on long wheat straw (Panivivat et al., 2004). Furthermore, substrate type has been shown to influence lying behaviour and dairy cow comfort (Haley et al., 2000; Tucker et al., 2004; Norring et al., 2010). Therefore, substrate type can potentially influence lying , play and grooming behaviour in calves, but currently there is limited understanding on the effect of different substrate types (that are available in New Zealand) on the behaviour of calves.
The use of preference tests have been widely used in animal welfare research as a tool to assess how an animal perceives its environment to help form recommendations regarding animal husbandry. Testing an animals' preference is the most direct and simplest way of asking an animal how it feels about its environment, telling us which option the animal prefers.

References

Panivivat, R., E. B. Kegley, et al. (2004). "Growth Performance and Health of Dairy Calves Bedded with Different Types of Materials." Journal of Dairy Science **87**(11): 3736-3745.

Hänninen, L., A. M. de Passillé, et al. (2005). "The effect of flooring type and social grouping on the rest and growth of dairy calves." Applied Animal Behaviour Science **91**(3–4): 193-204.

Hill, T. M., H. G. Bateman Ii, et al. (2011). "Comparisons of housing, bedding, and cooling options for dairy calves." Journal of Dairy Science **94**(4): 2138-2146.

Haley, D. B., J. Rushen, et al. (2000). "Behavioural indicators of cow comfort: activity and resting behaviour of dairy cows in two types of housing." Canadian Journal of Animal Science **80**(2): 257-263.

Tucker, C., D. Weary, et al. (2004). "Free-stall dimensions: effects on preference and stall usage." Journal of Dairy Science **87**(5): 1208-1216.

Norring, M., E. Manninen, et al. (2010). "Preferences of dairy cows for three stall surface materials with small amounts of bedding." Journal of Dairy Science **93**(1): 70-74.

2.4 JUSTIFICATION FOR THE PROJECT

a. What are the potential benefits of the research – to humans, animals, or the environment?

To investigate rearing substrates that enhance the health and welfare of dairy calves.
To provide information and recommendations for dairy farmers as to what bedding is preferred.

b. How will the results of this work be disseminated?

A report will be submitted to Dairy NZ on completion of the trial.
This work will be used as a Masters Thesis, presented as a conference abstract and peer-reviewed journal article.

2.5 DESCRIPTION OF PROCEDURES

(Detailed description of all procedures)

What will happen to the live animals? Give a step-by-step description of all procedures to be carried out on each group of animals. The use of your own flowchart, table or "research design" figure is recommended for complex experiments.

Animals:

24 (4 kept as spares) female replacement calves will be allocated into 5 groups at 5 days of age. Calves will be individually marked with FIL tail paint to facilitate identification via video cameras.
We do not anticipate having all calves born on the same day, having only 4 animals per treatment group removes large age and development variation.
The reason for having 4 calves per pen is so we can more accurately assess animal behaviour and in more detail.

Testing procedure:

Each group of calves will be given 4 consecutive phases: acclimatisation (free choice), restriction, pairwise and free choice.
Two groups will be tested at one time.

1. Acclimatisation (Free choice):
Firstly, each group will be placed within a large (5.8m2 per calf) pen containing all 4 bedding substrates for 7 days to acclimatise to the bedding and facilities.

2. Restriction:
Groups will receive 48 h restriction on each surface (2.8m2 per calf), to ensure they have adequate short term experience with each surface - 8 days.

3. Pairwise:
In order to rank preference of each surface, the groups will have 24 h with access to two surfaces at a time (5.8m2 per calf). Groups will experience all 6 combinations - 12 days
E.g. Sawdust vs. River stones; Sawdust vs. Sand; Sawdust vs. Rubber; River stones vs. Sand; River stones vs. Rubber; Sand vs. Rubber.

4. Free choice:
Groups will then have another free choice phase of all 4 bedding substrates (5.8m2 per calf) for 48h, to compare back to the original free choice phase.

Measures:

Behaviour:
For all tests HOBO activity loggers will be fitted to each calf's hind leg and behaviour will be recorded continuously using video cameras to measure lying standing, step/walk and run/play behaviour.

Environmental conditions
Temperature of the bedding surface and the ambient weather conditions in the barn will be measured continuously during the trial period using weather stations.

Blood Sampling
A total of 6 (2 evacuated vaccutainers per sampling) blood samples will be collected by jugular venepuncture from each calf over 8 days. Blood samples will be analysed for cortisol, glucose, lactate and Automated blood count (ABC's).
Bloods will be taken during the restriction phase only, as calves go onto each surface.
Bloods will be taken by the applicant and other technicians at AgResearch, this is a normal requirement of our job.

Calves will be approximately 5 weeks of age at the end of the study.

Are there any other procedures that do not involve live animals (e.g. tissue sample analysis etc)? Please provide details.
N/A

2.6 SCIENTIFIC DESIGN OF THE EXPERIMENT AND PROPOSED STATISTICAL ANALYSIS
(Give a clear description of the design of the experiment. Describe the statistical approach that will be used and evidence that the approach can yield answers to the proposed research question.)

The main hypothesis of interest is if there are behavioural differences between substrates and the main variable of interest is percentage of time spent lying. The study design is randomised (random allocation of calves to replicates, random ordering of restricted substrates and random ordering of pairwise comparisons). AgResearch statistician Dr Vanessa Cave has conducted a power analysis (based on previous work looking at behavioural differences of calves reared on river stones and sawdust) which assumes the calves within pens are independent. This assumption appears reasonable for calves 5 weeks and under based on previous work.

2.7 ADDRESSING THE THREE Rs
Replacement, Reduction and Refinement (or the "Three Rs") are the cornerstone for ethical use of animals in research, testing and teaching.
(Please complete all three sections – one to two sentences per section)

2.7.1 Replacement (what alternatives to animal use have you considered e.g. computer modelling)
There are no alternatives

2.7.2 Reduction (what ways do you propose to minimise the use of animals while still keeping the results meaningful)
By consultation with a statistician to use minimum numbers needed to obtain significant results.

2.7.3 Refinement (how have the procedures been refined to decrease the negative impacts these procedures have on animals e.g. analgesic use, appropriate housing, the skill of those involved in the use and care of the animals).
By using minimum numbers needed to obtain significant results.

2.8 ANIMALS TO BE USED IN TEACHING (I.E. UNDERGRADUATE LABS)

If no, proceed section 3		
2.8.1	Detail preparation of students for animal use	
2.8.2	Detail supervision of students	
2.8.3	Detail overall relevant experience of students	
2.8.4	Copy of laboratory handout is attached	

Section 3: Animals Used and Welfare

3.1 ANIMAL SUMMARY (Please also complete Appendix 1) Species scientific & Common name **ONE SPECIES PER LINE**		**Strain**	**Species Code (see Q1 of Animal Use Statistics Form Appendix 1)**	**Total number required** (over the life of the project)	**Grading of manipulation (see Q6 of Animal Use Statistics Form Appendix 1)**
1.	Cattle	Friesian / Friesian cross	g	28	B
2.					
3.					

3.2 WILL ANIMALS BE HOUSED OR HELD (SHORT-TERM OR LONG-TERM)? **If no, proceed to 3.3**		
3.2.1	Where will the animals be housed?	At AgResearch Ruakura Research Farm
3.2.2	Describe container (dimensions of cages / pens)	See attached document
3.2.3	How many animals per container / enclosure?	4
3.2.4	What will be the duration of housing?	Each replicate will be housed for 30 days before being returned to the farmer.
3.2.5	Who will be responsible for the care of the animals?	Myself and AgResearch Ruakura farm staff

3.3 PRIOR HISTORY OF THE ANIMALS

(If animals are to be used from another project a summary of the type of project, its protocol number, and other information such as the amount of time between projects etc. is to be stated)

N/A

3.4 MANAGEMENT OF ADVERSE EVENTS

(Describe any possible adverse events and how you might manage these. For example, proposed methods of prevention or control such as regular inspection, analgesic regimes and specified humane end points)

Any calf that becomes unwell on trial will be inspected by the Animal Welfare Officer/Veterinarian. Any calf with a persistent problem will be removed from the trial and replaced with another healthy calf.

3.5 FATE OF THE ANIMALS *(What will happen to the animals at the end of the experiment?)*
Returned to the farmer.

Section 4: Specific Procedures

4.1 INSTITUTIONAL DRUG ADMINISTRATION ORDER **(See Appendix 2)**
Is there an operational procedure required for the use of a product (drug /chemical) in the experiments? If 'yes' this will require an Institutional Drug Administration Order. Name of Product:

4.2. USE OF ANAESTHIC **If 'Yes' complete the table below**		
4.2.1	Name of anaesthetic	
4.2.2	Local or general	
4.2.3	Method of restraint	
4.2.4	Will animals have to recover from anaesthetic? How long is the recovery period?	
4.2.5	How will you deal with post-operative pain and/or discomfort?	

Section 5: Declaration

5.1 PERMITS AND APPROVALS		
5.1.1	Has an application been made to another Committee e.g. Ruakura?	Yes
5.1.2	Are any DOC permits required?	No
5.1.3	Are any Iwi approvals required?	No
5.1.4	Are any other approvals / permits required?	No

5.2 DECLARATION		CHECK
5.2.1	I have read and understand the conditions outlined in the Code of Ethical Conduct for the Use of Animals for Teaching and Research. http://www.waikato.ac.nz/research/unilink/ethics/animal_ethics.shtml	
5.2.2	I have read the Good Practice Guide for the Use of Animals in Research, Testing and Teaching http://www.biosecurity.govt.nz/files/regs/animal-welfare/pubs/naeac/guide-for-animals-use.pdf	
5.2.3	If this application is approved, I will inform the Committee of any changes in the project or unexpected outcomes affecting animal welfare, and any event (beyond any approved manipulation) impacting adversely on animal welfare.	
5.2.4	I will submit a complete Animal Use Statistics Form by the specified date.	
5.2.5	I will report as required to the Animal Ethics Committee.	

Signed by the applicant:

_____ **Date:**_____

I accept responsibility for this project's compliance with the University's Code of Ethical Conduct for the Use of Animals for Teaching and Research.

Signed by the Chief Supervisor (if applicable):

_____ **Date:**_____

I accept responsibility for this project's compliance with the University's Code of Ethical Conduct for the Use of Animals for Teaching and Research.

Appendix 1

Animal Use Statistics Form– one species per sheet

Note: Fill in the YELLOW areas now (this is part of the application form). The BLUE areas are to be filled in after the research has been completed, and a SIGNED hard copy of this form only is to be submitted to the AEC Coordinator by the completion date indicated on page 1 of this application form. P = Planned to Use AU = Actually Used

1. Animal Type: g **(see list on next page)**	

2. Source of Animals:	**P**	**AU**
Breeding unit		
Commercial		
Farm		
Born during project		
Captured		
Imported into New Zealand		
Public sources		

3. Status of Animals:	**P**	**AU**
Normal/conventional		
SPF/germ free		
Diseased		
Transgenic/chimera		
Protected species		
Unborn/prehatched		
Other		

4. Purpose:	**P**	**AU**
Teaching		
Species conservation		
Environmental management		
Animal husbandry		
Basic biological research		
Medical research		
Veterinary research		
Production of biological agents		
Development of alternatives		
Other		

5. Re-use:	**P**	**AU**
No prior use		
Previously used		

6. Grading:		**P**	**AU**
No impact	A		
Little impact	B		
Moderate impact	C		
High impact	D		
Very high impact	E		

(see attached grading form)

7. Alive:	**P**	**AU**
Retained [by your institution]		
Returned [to owner]		
Released [to the wild]		
Disposed of [eg to works or rehomed]		
Total Alive		

8. Dead:	**P**	**AU**
Killed for dissection, sampling		
Died/destroyed in the course of manipulation/use		
Euthanased after manipulation or use		
Died/destroyed for reasons not associated with manipulation/use		

Completed by:	
Signature:	
Date:	
Protocol No.	

ANIMAL TYPE CODES:
Type of animal used. No distinctions on basis of sex, age, breed, strain or physiological condition.

BOX 1	CODE LETTERS				CODE LETTERS		
Rodents	1	a	Mice	Birds	1	p	Fowls, Chickens
	1	b	Rats		1	q	Pigeons
	1	c	Guinea Pigs		1	r	Other Birds
	1	d	Hamsters	Miscellaneous	1	s	Marine Mammals
Rabbits	1	e	Rabbits		1	t	Possums
Farm Animals	1	f	Sheep		1	u	Reptiles
	1	g	Cattle		1	w	Amphibia
	1	h	Goats		1	x	Fish
	1	j	Deer	Other	1	y	Other Species (°name)
	1	k	Pigs				
Other Domestic	1	m	Horses				
Mammals	1	n	Dogs				
	1	o	Cats				

Grading of Manipulation Examples

Grade A – "No impact or virtually no impact"

Examples:

Mental state: Field observations of grazing behaviour on farms, or benign handling of tame and trained animals that are familiar with all personnel and procedures and with the place where the procedures are conducted.

Food/water: Animals kept outdoors eating their usual food in appropriate amounts; grazing trials on treated pastures; offering supplements to naturally available food; provision of complete, balanced rations to meet all nutritional requirements of animals maintained indoors.

Environmental challenge: Exposure to ambient conditions that are within the thermoneutral range; reduced barometric pressures which do not cause increases in red blood cell production.

Disease/injury/functional impairment: Studies of healthy uninjured animals that are kept in physical conditions which do not themselves lead to injuries such as lameness or compression sores; studies to establish normal characteristics of healthy animals.

Behaviour: Studies of wild or undomesticated animals in their natural habitats; field studies of domesticated animals.

Grade B – "Little impact"

Manipulations of minor impact and short duration

Examples:

Mental state: Experiments on completely anaesthetised animals that do not regain consciousness; simple venipuncture or venisection; injection of non-toxic substances; skin tests which cause low- level irritation without ulceration/erosion; feeding trained animals by orogastric tube; movement of free-range domesticated animals to unfamiliar housing; minor restrictions of water and/or feed intake beyond the normal period of satiation.

Food/water: Water priming for kidney function tests; short-term overall food intake restrictions or excesses that are within usual tolerance levels for the species; short-term changes in dietary composition that cause no clinical signs of deficiency or toxicity, but which would cause such symptoms in the longer term.

Environmental challenge: Exposure to levels of cold or heat that are outside the thermoneutral range, or barometric pressures that increase red blood cell production, but which remain within the capacity of the animals to adapt and do not lead to debility in the long term.

Disease/injury/functional impairment: Studies of vaccines using killed pathogens; tuberculosis tests; induction of mild fever without other debilitating effects; induction of subclinical parasitism; healing of minor superficial incisions, cuts or wounds; minor surgical and/or pharmacological modification of homeostatic capacity (for example, creation of non-obstructive gut fistulae; splenectomy; endocrine gland removal with complete and permanent hormone replacement therapy); physical conditions which cause transient lameness of low intensity, mild compression sores or abrasions.

Behaviour: Mild and short-term physical restraint; keeping free-range domesticated animals in a yard; movement of free-range domesticated livestock to unfamiliar housing; operant conditioning with positive reinforcement in barren laboratory environments; benign preference tests in unnatural surroundings.

Grade C – "Moderate impact"

Manipulations of minor impact and long duration or moderate impact and short duration

Examples:

Mental state: Recovery from major surgeries like thoracotomy, orthopaedic procedures, hysterectomy or gall bladder removal with effective use of analgesics; surgical procedures on conscious animals but with the use of local anaesthesia and systemic analgesic; movement of excitable free-range domesticated livestock to unfamiliar housing; short term capture, handling and restraint of wild or semi-domesticated animals that exhibit marked flight responses; moderate restrictions of water and/or
feed intake beyond the normal period of satiation.

Food/water: Simulation of usual overall intake restrictions often experienced by pregnant/lactating ruminants during cold winters or drought; dietary induction of milk fever in cattle; induction of mild deficiency or toxicity signs by feeding diets containing inadequate or excessive amounts of essential nutrients.

Environmental challenge: Short-term exposure to severe extremes of cold or heat which would lead to collapse if prolonged.

Disease/injury/functional impairment: Studies of live vaccines; induction of clinical parasitism; induction of mild reversible infectious diarrhoea; moderate surgical and/or pharmacological modification to homeostatic capacity (for example, limited gut resection; endocrine gland removal with delayed or incomplete hormone replacement therapy); physical conditions that cause minor chronic lameness or other injuries; studies of the effects of infectious or toxic agents that cause rapid death without distress.

Behaviour: Medium-term restrictions of instinctive behaviour; medium-term holding of ruminants in a metabolism crate; long-term restraint leading to the development of reversible stereotypies; changing social group composition.

Grade D – "High impact"

Manipulations of moderate impact and long duration or high impact and short duration

Examples:

Mental state: Recovery from major surgery under anaesthesia without the use of postoperative analgesics; marked social or environmental deprivation; longer term capture, handling, restraint or housing, without the use of tranquilisers, of wild or semi-domesticated animals that exhibit marked flight responses.

Food/water: Dietary induction of advanced pregnancy toxaemia in sheep or ketosis in dairy cattle; dietary induction of advanced signs of nutrient deficiency or excess; severe deleterious effects of dietary toxins; severe restrictions of water and/or feed intake beyond the normal period of satiation.

Environmental challenge: Prolonged exposure to severe cold or heat that would lead to failure of thermoregulation and collapse, but the exposure is terminated just before those outcomes.

Disease/injury/functional impairment: Studies of severe facial eczema; induction of severe diarrhoea or severe infectious pneumonia; protracted or irreversible pharmacological modification of homeostatic capacity (for example, chemical induction of diabetes mellitus without replacement therapy); marked surgical modification of homeostatic capacity (for example, extensive gut resection; cutting of sensory or motor nerves serving large areas of the body from which no self-mutilation injury results; precise lesioning of limited areas of the brain but with intervention before collapse); physical conditions that cause moderate chronic lameness or other injuries; studies of the effects of infectious and toxic agents that cause either a protracted death with minor distress or a rapid death with moderate distress.

Behaviour: Application of marked and repeated noxious stimuli from which escape is impossible; prolonged periods (several hours or more) of close physical restraint; marked alterations to the perceptual or motor functions of animals to test consequent behaviour.

Grade E – "Very high impact"

Manipulations of high impact and long duration

Examples:

Mental state: Conducting major surgeries without the use of anaesthesia on control animals in assessing efficacy of analgesics; testing the efficacy of analgesics in animals with severe induced pain.

Food/water: Experiments that cause animals to die from poisoning by toxins in the diet; protracted and severe restrictions on water and/or feed intake.

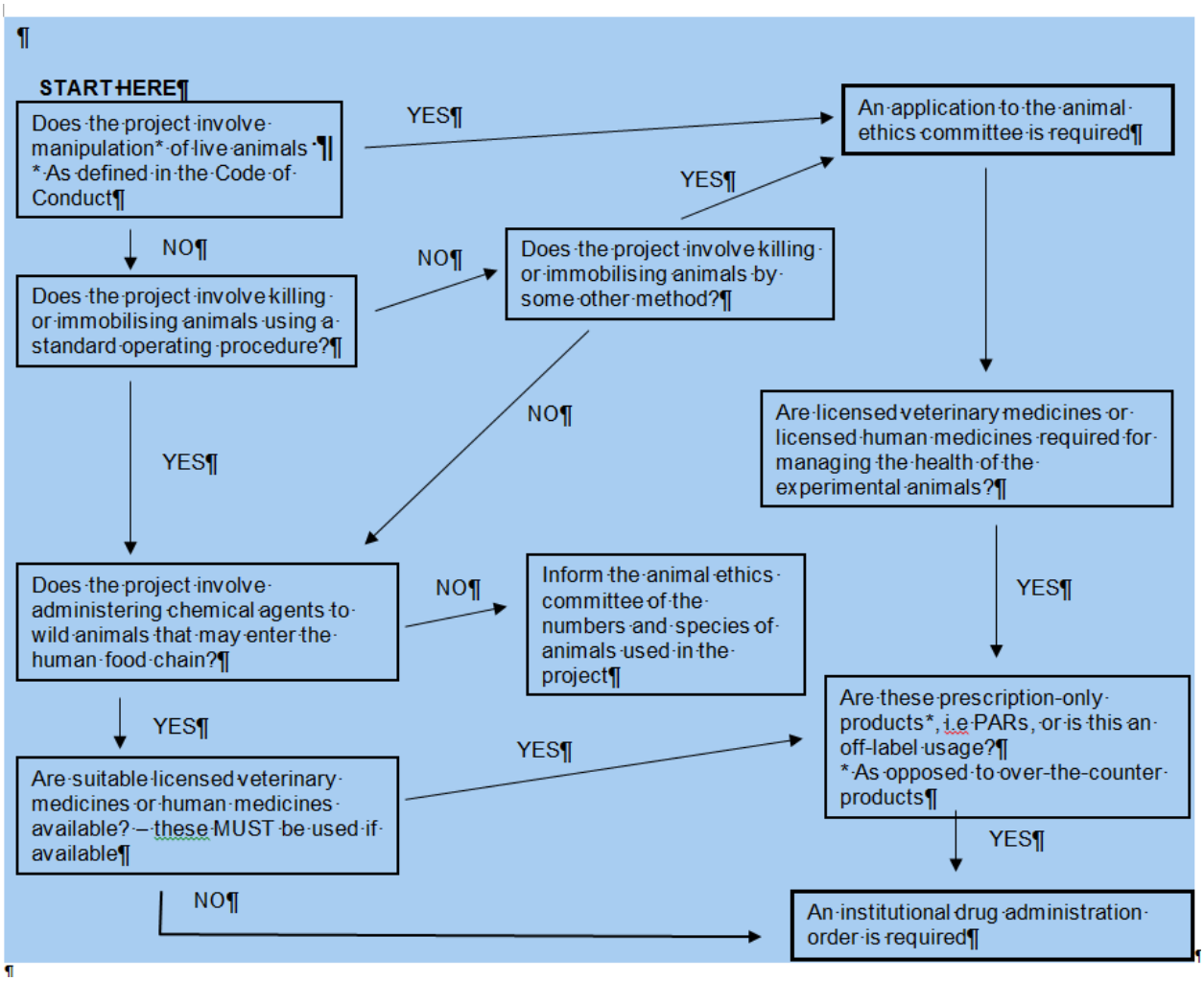
Environmental challenge: Purposeful exposure of conscious animals to lethal extremes of cold, heat or barometric pressure which duplicate naturally occurring conditions.

Disease/injury/functional impairment: Studies of methods for killing pest animals; cutting of sensory or motor nerves serving large areas of the body from which self-mutilation injury results; evaluation of vaccines where death is the measure of failure to protect; studies of the effects of infectious or toxic agents which cause either a protracted death with marked distress or a rapid death with severe distress.

Behaviour: Application of marked and repeated extremely noxious stimuli from which escape is impossible; prolonged periods (several hours or more) of close physical restraint.

Appendix 2

Is an Institutional Drug Administration Order (IDAO) Required?



If a decision remains unspecified then no further action is required.